



POST OFFICE

Report of the Mobile Radio Committee



LONDON: HER MAJESTY'S STATIONERY OFFICE
1955

NINEPENCE NET

Report of the Mobile Radio Committee

Postmaster General,

1. You appointed us in May, 1954, to advise you on questions affecting the users of V.H.F. mobile radio services and especially on the problems arising from the decision to clear Band III for television.

Introduction

2. In an interim report* in December, 1954, we explained that we had first addressed ourselves to the latter problems and we described the stage we had reached in our enquiry. We felt at that time that we were not in a position to make a firm recommendation, even as regards the immediate changes that should be made in the frequencies available for land mobile radio services. It seemed to us that we would need to take a number of matters further before we could make such a recommendation ; these matters included :

(a) The question whether within the present frequency space provided for the private land mobile services there would be adequate opportunity for development for a few years.

(b) The question whether the present sub-allocations of frequency space to different categories of mobile radio user were the best possible and whether the margins available for development could be increased by revising these sub-allocations.

(c) The size of the "guard band", if any, between the blocks of frequencies used by the base and mobile transmitting stations of the land mobile services.

(d) The size of the "guard band" between television services and land mobile services.

(e) The arrangements to be made regarding security of tenure of the new frequency bands allocated to land mobile services.

3. In that report, too, we mentioned other matters that would need to be examined before recommendations could be made regarding the provision required to cater for further development (i.e., in the longer term) of the land mobile services. We pointed out that it would be necessary to widen our enquiry regarding likely development of the services, to consider also the probable course of development of the maritime mobile services and to review the frequency requirements of other civilian radio services at present operating on frequencies close to the frequencies at present available for land mobile radio.

4. Finally we recommended that we should be given a further limited period to enable us to pursue our enquiries in the hope that we would be able to make an agreed recommendation at any rate on the immediate change in the frequencies for land mobile services at present in or near Band III, to enable television to be developed in that band. You accepted that recommendation and emphasised your desire that an agreed solution of the problem should be found as early as possible. You accordingly asked that we should make a further report to you by the end of March, 1955. At the same time you decided to make certain changes in the composition of the Committee, in particular the addition of three independent members. The new Committee (constituted as shown in Appendix 1) was appointed in January, 1955, and we had our first meeting on the 7th February.

* Not published.

5. We regret it has not been possible to reach unanimous agreement about the new frequencies to be allotted to the land mobile radio services affected by the Government's decision to clear Band III for television, and we particularly regret that one of our members (Captain L. P. S. Orr, M.P.) has found it necessary to dissociate himself from our report, despite the fact that all other members of the Committee spared no effort to find fair and reasonable compromise solutions.

General approach to the problem

6. At our meeting on the 7th February we agreed that our first task was to deal with the question of reaccommodating the private land mobile services operating in, or close to, Band III and we recognised that, although it would obviously be desirable to deal also in our report with the requirements of the land mobile services for future development, it might not be possible to make positive recommendations in the time available. In separating the short-term from the longer-term problem we had, of course, to consider the consequence of adopting an arrangement designed in the first place, at any rate, to meet the situation for the next few years. Putting this in another way, the Government's decision to clear Band III for television had as a necessary consequence the transfer of land mobile services to another part of the spectrum and we had to assure ourselves that any new bands of frequencies we recommended would meet the situation in regard to the development of such services in the shorter term.

Present position

7. The frequency space in the V.H.F. bands at present provided for private land mobile services amounts to 12.4 Mc/s. This space is provided in two groups of frequencies, the "high band" and the "low band". Details are given in Appendix 2, but broadly speaking 7.3 Mc/s are provided in the high band and 5.1 Mc/s in the low band. The frequencies in the low band are not affected by the decision to clear Band III (174-216 Mc/s) for television and our enquiry has therefore been concerned primarily with land mobile services operating in the high band (170.85 to 175.05 Mc/s and 180.85 to 183.95 Mc/s), part of which is within Band III and the remainder of which adjoins it. The number of private land mobile radio stations operating at the end of December, 1954, was about 6,700, of which some 2,400 (or about 36 per cent.) were in the high band. The private land mobile services include numerous types of user, e.g., transport services, taxi cabs, electricity and other public utility services, ambulances, doctors and veterinary surgeons, and certain press services. Most of these services operate both in the high and low band. Separate frequencies in other parts of the spectrum are allocated to the police and fire services.

Factors affecting the short-term solution

8. Against this background it seemed to us that there were two main factors which we should consider in trying to find a solution for the short-term position; namely, the margin for development within the existing frequency space provided (this itself being dependent on the expected rate of development of the services within the next few years), and the extent to which frequency channels for land mobile services could be provided either by common use of channels with maritime mobile services or by taking up temporarily channels which are at present spare in the maritime mobile band.

Margin for development

9. As regards the first, we examined in detail the extent to which the available channels both in the high and in the low band had been actually

taken up. The conclusion we reached was that at present there is spare capacity which would be available for some further expansion throughout the country.

10. In the light of information provided by some of the interests concerned, we also considered the probable development in the London area in the various categories of land mobile radio users within the next three years. We concentrated on the London area as it seemed to us to be the major problem. In adopting three years as the basis for this study, we had in mind that estimates of development in what is still a relatively new art were bound to be speculative and that estimates for anything but a short period could not be reliable. As we have seen from paragraph 7 there are numerous categories of user and we set out in Appendix 3 the figures we had before us of the estimated development in the London area during the next 3 years among the more important categories. The Appendix also shows, for purposes of comparison, the actual development during the past few years. A comparison between recent and future development cannot, of course, be taken too far if only because the absence of a decision about the new frequencies to be allotted to land mobile radio, when these services have to move from Band III, has no doubt made that development slower than would otherwise have been the case.

11. Although there must be uncertainties and some of the estimated figures of development seem high in comparison with recent development, we did not as a Committee feel that, with one notable exception, any serious comment need be made on the figures. That exception is the estimated increase in 3 years from some 500 transmitters used by trade cars* to 12,000 in the London area. This estimate was prepared by the Mobile Radio Users' Association who informed us that it was based on a Questionnaire sent to 500 transport managers selected by the Industrial Transport Association. We were also informed that the estimate took into account the result of interviews of about 75 transport carriers or individuals in the London area, and development in this field in the United States. The Association had also consulted several manufacturers and had circulated the estimate to members of the Association for comment. The small scale of development by this category of user up to date itself suggests that estimates must be highly speculative. As a Committee we were unable to accept the Association's figures as being statistically representative; in our view it would be necessary, in order to make a firm estimate, to carry out a detailed survey in consultation with the appropriate national organisations. Although the representative of the Association still considers the estimate to be realistic, the rest of us feel that this is not so. For instance, the possible use of private mobile radio on long-distance road haulage services seems obviously more limited than in other cases, and the system under which traders' own transport at present operates, provides little opportunity or necessity for the use of such equipment. We should be surprised if development in the next three years represented any more than a threefold increase over the present figure, i.e., from 500 to 2,000 stations in London. The Association's forecast would require, on the present prescribed technical standards, an allocation to trade cars, for the next 3 years, of 20 Mc/s, which far exceeds the total frequency space provided in the VHF band for all categories of land mobile radio user. Whatever view may be held about future development, the practical situation is that spectrum space is simply not available for development on the scale postulated in this estimate, and the lack of spectrum space would, itself, necessitate the

* Commercial vehicles and private cars used for commercial purposes.

introduction of a restrictive licensing policy (which we understand the Post Office has so far tried to avoid) so as to determine and regulate priority in the use of land mobile radio.

12. It would clearly be wrong to recommend a plan for the next few years which would provide no margin for development of land mobile radio by trade cars, but we believe that some margin can in fact be provided.

Sharing land and maritime mobile channels

13. As to the second factor mentioned in paragraph 8, it was suggested to us that the problem arising in relation to land mobile radio services might be eased by arranging for common use of particular channels by maritime and land mobile radio services or by allocating temporarily, at any rate, to land mobile services channels in the maritime mobile band which are at present unused. As regards the possibility of common use, our enquiries showed that a large part of, if not all, the maritime mobile band could be made available to the land mobile services in the industrial Midlands, and the West Riding. On the other hand, the greatest density both of land and maritime mobile services is in London and the main cities on the coast, and we feel there can be little, if any, prospect of common use by the two mobile services in such areas. Moreover, radio offers the only means of communication with ships. In addition two frequencies, which are in the maritime mobile band, have been tentatively allocated for radio astronomy and are used for reception only in the Cambridge and Manchester areas. It would be detrimental to such use if these frequencies were assigned to land mobile services in these areas. Our general conclusion, therefore, is that the use of maritime mobile channels by land mobile services can be arranged only in particular localities and that this course can be no more than an expedient which could be adopted in those areas if circumstances made it necessary.

14. As regards the question of temporary use of channels in the maritime mobile band not at present taken up, we took note of information given to us by the representative of the Radio Advisory Service about the probable development of V.H.F. maritime mobile services. These services are still in a fairly early stage of development and a good many problems affecting the maritime mobile band are dependent on the conclusion of international agreements. Our conclusion is that it would be unwise to try to meet the immediate problem of the land mobile services by using parts of the maritime mobile band, although the question of the best use of these two bands could be re-examined when the situation in regard to V.H.F. maritime mobile services becomes clearer.

Security of tenure

15. We understand that in the discussions leading up to the appointment of our Committee in May, 1954, the Mobile Radio Users' Association were most anxious to ensure that security of tenure should be provided for the new frequencies allotted to land mobile radio services when the present frequencies were moved from Band III. The general argument of the users in favour of security of tenure is, of course, that they naturally wish to be assured individually when investing money in radio equipment that they will not be faced, through circumstances beyond their control, with additional expenditure in order to retain the service. This is a simple concept to express but especially in a service that is developing rapidly, its practical application raises a number of difficulties. We recognise that

security in bands of frequencies for any service must be subject to qualification, if only because of the obligations of international agreements, to which the United Kingdom is or may become a party, and because considerations of national security must be over-riding. Moreover, an undertaking to guarantee security of tenure, even subject to qualifications of that kind, would be a new departure in frequency allocation and would inevitably have an impact on arrangements that may be made in the future for frequency allocations to other services.

16. The Mobile Radio Users' Association take the view that even with the foregoing necessary qualifications to security of tenure in bands of frequencies, it is essential for the proper development of the land mobile services that the individual user should have security of tenure for a defined period in the channel in which his service operates. One of the manufacturing organisations which we consulted (see paragraph 20 et seq. below) and which, we understand, at present supplies some 80 per cent. of the private land mobile equipment now in use, strongly supported this view. The representatives of the other manufacturing interests would also like to see some arrangement made to restrict to a minimum the changes in frequency bands allocated to individual services but they recognise the practical difficulties and possible disadvantages to the users of these services as a whole, of giving a guarantee of security of tenure to individual users.

17. Our approach to this difficult problem was to examine the possibilities of giving effect to the Association's intention within the limits of practicalities, bearing in mind that nothing should be done which would hinder the most efficient use of the limited frequency space that can be made available for any individual service. If a rigid guarantee to individual users be given, this might well impede the introduction of measures designed to make better use of the frequency space than is possible at present. For instance, if a reduction (which from the technical point of view is already feasible) could be made in the space allotted to each channel (at present 100 kc/s) the ultimate capacity of the whole band could be increased; but guarantees to individual users might well impose a serious delay on the introduction of such a change. As a matter of general principle we take the view that, if the fullest use of the spectrum is to be made, it is of fundamental importance to avoid rigidity.

18. We recommend that an assurance on behalf of the Postmaster General be given that, subject to the inescapable qualifications mentioned in paragraph 15 above, no change should be made for at least 5 years in the *bands* of frequencies in the V.H.F. range which may be allocated to the land mobile services as the result of our recommendations. Should any revision of these bands subsequently become necessary, no changes should be introduced without full consultation with the interests concerned, one object of such consultation being to keep to a minimum the disturbance that would be caused. Both in this matter and in other matters affecting land mobile services, we regard the establishment of regular consultative machinery as of great importance and in paragraphs 31 and 32 below, we make certain recommendations about the character of such machinery. We would stress, too, the need to confirm the present practice of giving a period of notice (to be established) of impending changes of frequencies and technical standards and a further period (also to be established) before changes in equipment (to make this conform to the new arrangements) are made compulsory. The question, whether the assurance could be renewed after the 5 year period had elapsed, should be examined in the light of the circumstances then prevailing.

19. The representative of the Radio Advisory Service, in endorsing this recommendation, pointed out that the desire for security of tenure was not exclusive to land mobile radio users, but shipping interests did not consider it necessary to seek a similar assurance because the maritime mobile band is not being altered under the Committee's recommendation and because well-tried machinery for consultation with the shipping interests already exists. Although we are unanimous as a Committee in making this recommendation and have given prolonged and weighty consideration to the views of the users, the representatives of the Mobile Radio Users' Association and of the local authority ambulance services do not consider that it goes far enough : in their view a guarantee of security of tenure, for a period, should be given to individual users. The rest of the Committee believe, however, that this recommendation is reasonable and fair.

Evidence of Manufacturers

20. A move of the existing services from their present frequencies clearly raises a number of practical problems. We agreed, therefore, that it would be most desirable before coming to conclusions to consult the manufacturers of mobile radio equipment and to invite them to comment on the factors which, in their view, should be taken into account in considering the problems. A list of the manufacturers consulted is given in Appendix 4.

21. It is clearly desirable that the new frequency space should be close to the space at present used by these services ; a change to a nearby band will, among other things, limit the extent of changes in equipment and the cost of such changes. From this point of view, the most convenient arrangement seemed to us to be to accommodate the land mobile services immediately below Band III (174-216 Mc/s). The practical problem was to decide whether the land mobile services could be reaccommodated in the space intermediate between the top of the maritime mobile band (165 Mc/s) and the bottom of the television band (174 Mc/s).

22. We greatly appreciate the help and co-operation given to us by the manufacturers and their comments were of great assistance to us in framing our recommendations. The points arising from our discussion with manufacturers, of which we would make special mention, are as follows :

(a) Guard band between television and land mobile services.

The problem here is to determine how much frequency space should be allowed as a guard band between the lower limit (176 Mc/s) of the nearest television channel and the upper limit of the highest land mobile channel in order to avoid as far as possible mutual interference between television and land mobile services. Given the many claims on the spectrum it is clearly essential that guard bands, designed to avoid interference, should be kept to the absolute minimum, if the spectrum is to be fully utilised. Large guard bands can be regarded as a counsel of despair, and it is obviously right that the remedy should be found, if at all practicable, by preventing interference from arising. In this context there are really two problems ; first, interference to land mobile services from television transmitters and, second, interference from land mobile services to television reception ; the second is undoubtedly the major problem. Since no television service is yet operating in Band III it is difficult to assess precisely the risk of interference of either kind, and this point was stressed by the representatives of the manufacturers. Both the Post Office and the manufacturers have given much attention to this problem and we understand that the Post Office have in mind that, in the light of experimental work to be undertaken when Band III television transmitters are available, the broadcasting authorities should be required to take steps to limit the out-of-band radiations from

television transmitters. This point is of particular importance in relation to the use of channel 6 (176–181 Mc/s) which will, however, not be used for the first three stations to be opened by the Independent Television Authority. On the evidence at present available we have reason to suppose that a guard band of 2 Mc/s between the land mobile and television channels will be sufficient to prevent any appreciable interference by television to the land mobile services. This concerns, of course, only the first problem mentioned above; as regards the second, namely interference to television reception, the evidence available to us suggests that here again a guard band of 2 Mc/s would provide reasonable protection. The risk of this kind of interference is, however, more wide-spread and if it could be provided we are inclined to think that the guard band should be somewhat greater. The problem could, in our view, be eased if greater selectivity could be introduced in the design of television receivers, and the advantages from this course were emphasised by Messrs. Hudson Electronic Devices Ltd. We have not had an opportunity of discussing this point with the manufacturers of television receivers and we recommend that it should be investigated independently.

(b) Frequency separation between base and mobile transmitters

The land mobile services in this country operate in the main on a two-frequency basis; that is to say one frequency is used for transmissions from the base station to the mobile units and a different frequency for transmissions in the reverse direction. The base station receives of course the mobile transmitter's frequency. Interference may result, for example, when one or more base transmitters, and a base receiver, all of different systems, are located close to each other and when the frequencies themselves are not widely separated. There is at present a wide separation between the frequency blocks for base and mobile transmitters and if these blocks are brought closer together the problem of interference may be accentuated. It can, however, be minimised by careful selection of frequency channels in the "base" and "mobile" blocks, and careful siting of the transmitters. We discussed this problem with the manufacturers and our conclusion is that the problem can be satisfactorily met if there is a separation of 1.5 Mc/s between the two blocks of frequencies and a flexible sub-allocation of the channels within the blocks.

(c) Time required to modify the equipment

As there are some 2,150 mobile stations and some 250 base stations in the high band, a complete transfer of the services to new frequencies will be a sizeable operation. The time required for it will clearly depend on the character of the changes to be made but we were assured by the manufacturers that their resources would be adequate to carry out the transfer provided that reasonable notice could be given. As a broad estimate, we understand that a complete change-over would require about a year. The interests immediately concerned—manufacturers, their agents and users—could obviously ease the transition by co-operating closely in working out the detailed arrangements.

(d) Cost of modifying the equipment

We are advised that the cost of the changes will fall principally on the users. It is difficult to estimate this in advance since it is bound to vary a good deal in individual cases. As we explained in paragraph 22 (b) above, each unit of equipment used in "two-frequency" systems operates on separate frequencies for transmission and reception. The plan we are

recommending will, for the reasons given in paragraph 26 below, enable the changes to be confined, in the case of a high proportion of the existing services, to one of these two frequencies, and this will obviously help to reduce the cost of the change. We asked the manufacturers for estimates of cost but, perhaps naturally, their estimates vary considerably, since the circumstances in individual cases may themselves vary so much. Our impression is, however, that the cost of alteration of each station may range from £10 to £25. Additional cost may also arise at base installations if changes in the aerial system are required; in exceptional cases, this may be as much as £100.

(e) Channel widths

We were impressed by the unanimity of view on the part of manufacturers that before long it would be possible to reduce the width of the frequency channels from the present figure of 100 kc/s to 50 kc/s. Such a development would clearly be of great importance since, broadly speaking, a change from 100 kc/s to 50 kc/s in the channel width of any given service approximately doubles the potential capacity of the band. We understand that in the case of the land mobile services the technical problems associated with this change have largely been solved and the manufacturers estimated that the introduction of 50 kc/s channelling could, if necessary, begin to be introduced in one or two years.

New frequency plan

23. We considered a number of alternatives and in view of the circumstances described in the earlier paragraphs of this Report we recommend a plan which provides 7.3 Mc/s for private land mobile services between 165–173 Mc/s (the remaining 0.7 Mc/s being required for other services). The plan is shown in detail in Appendix 5, but we would like to make the following comments:

(a) The plan will enable the immediate problem of reaccommodating the services to be met without any change in the present maritime mobile band.

(b) There will be a "guard band" of approximately 3 Mc/s between the upper limit of the new band and the lower limit of the nearest television channel.

(c) The frequency space allotted to the two-frequency services will be slightly greater than at present; this is made possible by a corresponding reduction in the frequency space at present available (but very lightly used) for single frequency services.

(d) There will be a frequency separation of 1.6 Mc/s between the blocks of frequencies for the base and the mobile transmitters; this intervening space will be used to accommodate the single frequency services and certain other services.

24. It has been the practice to assign to the main categories of user individual channels or groups of channels within the frequency blocks. The present sub-allocation plan was introduced in 1949 and has remained virtually unaltered since that time. As is shown in Appendix 3, the forecasts of development among the different categories of user vary widely. Moreover, certain types of land mobile service may present special problems in certain parts of the country; for example, the representative of the Local Authority Ambulance Services drew our attention to difficulties which exist because of congestion on the ambulance channels in the area round Liverpool.

These matters of themselves call for a special reconsideration of the present plan. In the time available to us we have not been able to make a detailed study but we have made a provisional examination of the problem with the object of satisfying ourselves, as far as we could, that it would be possible by rearrangement of the existing sub-allocation plan to cater for some development of land mobile services within the present total frequency space available, and, in particular, that a revision of the plan would assist in providing for development within the next three years on the scale indicated in paragraphs 9-12 above. We regard the results of our provisional examination of this problem as encouraging. Firm proposals regarding a new sub-allocation plan could only be made after consultation with the interests directly concerned, and we recommend that enquiries to this end should be undertaken as a matter of urgency.

25. We also considered the arrangements in regard to sub-allocation of individual channels that should be made, pending the general review suggested above, if our new frequency plan recommended in paragraph 23 is approved. The problem here is two-fold; first in relation to existing users who will have to change the frequencies at present assigned to their services, and second, in relation to new users whose services would be accommodated in the new band. It would be possible to make minor adjustments in the present sub-allocation plan, but on the whole we feel that it would be better to make no changes in the meantime. We believe that on the basis of the existing sub-allocation arrangements there is sufficient margin available for development of the land mobile services for the period required to complete the proposed enquiry into these arrangements as a whole.

26. If our proposals are adopted, the effect of the change-over of existing services to the new frequency band recommended in paragraph 23 would, broadly speaking, be as follows. The frequencies of base transmitters and mobile receivers operating between 180.9 and 183.9 Mc/s will in general have to be changed but the only changes that will be necessary in the present frequencies used for mobile transmitters and base receivers will be those between 173.1 and 173.9 Mc/s and those of the single frequency services operating at present between 174.0 and 175.0 Mc/s. The great majority of frequencies for mobile transmitters, that is to say, those below 173.1 Mc/s could remain unaltered; and even for those between 173.1 and 173.9 Mc/s experience may show that the degree of interference between the mobile transmitters and television will not be sufficiently serious to make this transfer necessary. The timing of the changes will necessarily be dependent on the development of television services in Band III.

27. We are conscious that the recommendations made in paragraphs 23 to 26 do not constitute a complete solution of the problems arising in relation to the land mobile services because of the necessity to move these services from their present frequencies in and near Band III. Some of the problems, notably the necessity to revise the present sub-allocation plan would, of course, have arisen in any case. In our view, however, the arrangements recommended in these paragraphs will provide a satisfactory and practical solution of the immediate problems.

The Future

28. One of the main problems for the future arises in relation to the provision to be made for the probable development of land mobile services. This question has many aspects but one on which we should like to make some general comments in this Report is the possibility of providing for development of land mobile radio services in the UHF frequency range.

29. The frequency band 460 to 470 Mc/s is already allocated to fixed and mobile services in this country, but so far the manufacturers have considered this band too narrow to make it worth-while to develop and market land mobile equipment to operate in it. Against the background of this Report the use of UHF by land mobile radio seems bound to be required if there is to be full development of these services, and it is of great importance that a full study of the technical and other problems that arise be made, in order to enable this result to be achieved.

30. The main questions requiring study appear to us to be the amount of space in the UHF band that should be allocated, the cost of the equipment and the type of land mobile service that should operate in the UHF range. As regards the first, we understand that the Post Office in consultation with other users is planning to extend the band downwards to 450 Mc/s so as to make it 20 Mc/s instead of 10 Mc/s wide as at present. In the time available to us we have not been able to examine fully whether any additional space will be required or what problems would arise in providing it. As regards the second, it is clear that if space in the UHF range is to be used, the necessary equipment must be produced at a cost which is considered reasonable by the users of the land mobile radio service. The manufacturers are agreed that UHF equipment will, at least initially, be more expensive than equipment operating in the VHF bands; in their evidence to us, however, they gave widely differing figures, ranging from 25-200 per cent. as the expected increase over the cost of equipment at present used in the VHF band. In considering this aspect however, regard must be paid to the fact that radio is a rapidly developing art and that there has so far been no compelling reason for the development of efficient, but cheap, apparatus for operation in the UHF band. Both on the principle that necessity is the mother of invention and because it would be against previous experience in similar fields to conclude that it would be impossible to produce reasonably priced UHF equipment, we do not regard as conclusive the forecast of inevitable and substantial increases in cost. As regards the third point, the manufacturers were agreed that the service that could be provided in the UHF range will not be so effective under comparable conditions as that in the VHF range. Whatever limitations there may prove to be in the types of service that should be placed in the UHF range, a firm appraisal clearly requires a much more fundamental study of the problem that has been made hitherto. Bearing these points in mind we recommend that the question of further development of the UHF band for land mobile services should be tackled vigorously and as a matter of urgency.

Machinery for Consultation

31. Our examination of the immediate problems affecting land mobile services has emphasised the great importance and value of regular consultation with the interests concerned and we are convinced that regular consultative machinery should be established. The problems which should come within machinery of this kind are two-fold; first, problems of a general character concerning a number of interests, and second, problems of particular concern to the land mobile radio users. The first group includes the problems of the sub-allocation plan (paras. 24 to 25 above), of the channel widths (para. 22e), of further development generally and of the possibilities of catering for development in the UHF range (paras. 28-30). We recommend that an advisory body be appointed to examine these problems and to maintain a general supervision over any other problems of comparable significance that may arise, including problems in connection with the introduction of the plan recommended in paragraphs 23-27 above.

32. The second group of questions are those of immediate concern to the land mobile radio users. Examples are the problems arising out of the assignment of frequencies to individual services and the planning of new services in relation to existing services. We consider that the machinery for discussing questions of this character could most appropriately be settled by the body whose appointment we recommend in paragraph 31.

Summary of conclusions and recommendations

33. Our conclusions and recommendations may be summarised as follows:

- | | Para. No. |
|--|-------------------|
| (1) The common use of "maritime mobile" channels by land mobile services can be arranged only in particular localities as an expedient to be adopted if circumstances make it necessary. | 13 |
| (2) It would be unwise to try to meet the immediate problem of the land mobile services by using parts of the maritime mobile band, although the question of the best use of these two bands could be re-examined when the situation in regard to VHF maritime mobile services becomes clearer. | 14 |
| (3) An assurance on behalf of the Postmaster General should be given that, subject to certain qualifications, no change will be made for at least 5 years in the <i>bands</i> of frequencies in the VHF range which may be allotted to the land mobile services as a result of our recommendations. | 18 |
| (4) The present practice of giving a period of notice of impending changes of frequencies and technical standards, and a further period before changes in equipment are made compulsory, should be confirmed and the periods established by consultation. | 18 |
| (5) The question of improving the selectivity of television receivers operating in Band III should be investigated in consultation with manufacturers. | 22(a) |
| (6) A reduction in the width of the existing mobile radio frequency channels from 100 kc/s to 50 kc/s should be fostered. | 22(e) |
| (7) The new plan for private land mobile services should provide 7.3 Mc/s between 165 and 173 Mc/s, details to be as shown in Appendix 5. This space will provide for existing services and a margin for some further expansion. | 9, 23 |
| (8) Studies regarding the sub-allocation plan for land mobile services should be undertaken urgently, but in the meantime no changes are recommended. | 24, 25 |
| (9) Studies should be undertaken of questions relating to the use of UHF for land mobile radio services. | 29, 30 |
| (10) Regular consultative machinery should be established for consideration of matters affecting the land mobile services. These should include questions relating to the sub-allocation plan, channel widths, further development generally and development in the UHF range, and practical questions relating to the introduction of the new frequency plan. | 18, 31
and 32. |

Minority Report

34. This report has been agreed by all of us except Capt. L. P. S. Orr, M.P. A minority report by Captain Orr is attached together with comments on it by the rest of the Committee.

Acknowledgement of secretarial services

35. Our work has been arduous and has involved much detailed enquiry. The Joint Secretaries have responded most ably and willingly to the many calls we have made upon them, and the speed with which they have produced material for us has been commendable. We should like to express our warm appreciation for all that they have done.

R. J. P. HARVEY (*Chairman*).

J. BANFIELD.

DON C. CLARK.

H. D. EDWARDS.

A. HIBBS.

F. JERVIS SMITH.

R. L. SMITH-ROSE.

C. W. SOWTON.

H. S. VIAN-SMITH.

F. J. WYLIE.

R. H. JEBB
R. E. SIMMS } *Joint Secretaries.*

29th March, 1955

APPENDIX 1

(para. 4 refers)

COMPOSITION OF THE COMMITTEE

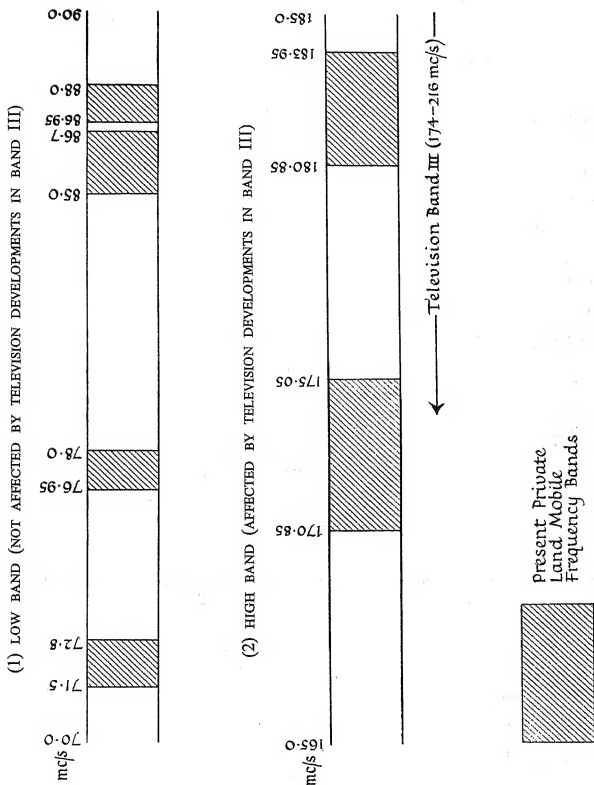
Chairman (Post Office)	Mr. R. J. P. Harvey, C.B.
Post Office	Mr. A. Hibbs, B.Sc., A.M.I.E.E. Mr. C. W. Sowton, B.Sc., A.C.G.I., A.M.I.E.E.
Ministry of Transport and Civil Aviation.	Mr. D. C. Clark. Mr. J. Banfield.
Mobile Radio Users' Association...	Capt. L. P. S. Orr, M.P.
Radio Advisory Service to the Chamber of Shipping and Liver- pool Steam Ship Owners' Associa- tion.	Capt. F. J. Wylie, R.N. (Retd.).
Member representing Local Autho- rities' Ambulance Services.	Mr. H. D. Edwards, Ambulance Officer, Cardiff.
Independent Members	Dr. R. L. SMITH-ROSE, C.B.E., D.Sc., M.I.E.E., Director of Radio Re- search, Department of Scientific and Industrial Research. Mr. F. Jervis Smith, M.I.E.E., Deputy Secretary of the Institu- tion of Electrical Engineers. Mr. H. S. Vian-Smith, M.C., Secre- tary of the Home Affairs and Transport Division of the Asso- ciation of British Chambers of Commerce.
Secretaries	Mr. R. E. Simms (Mobile Radio Users' Association). Mr. R. H. Jebb (Post Office).

NOTE: Expert advisers (who would not have any connection with any radio equipment manufacturing company) could also attend meetings of the Committee in a consultative capacity, for discussion of particular subjects.

APPENDIX 2

(para. 7 refers)

DIAGRAMS SHOWING FREQUENCY SPACE AT PRESENT USED BY THE
PRIVATE LAND MOBILE SERVICES



APPENDIX 3

(paras. 10 and 11 refer)

STATEMENT OF EXPECTED DEVELOPMENT, IN THE LONDON AREA, OF PRIVATE LAND MOBILE RADIO SERVICES AMONGST THE PRINCIPAL CATEGORIES OF USER COMPARED WITH THEIR PRESENT DEVELOPMENT

<i>Category of user</i>	<i>Number of transmitters licensed in the London Area (31st December, 1954)</i>	<i>Users' estimates of number of transmitters expected in the London Area in 3 years</i>
Ambulances	411	640
Press services	29	52
Gas	13	34
Water	30	98
Electricity	54	117
Railways (including LTE services)	38	133
Taxis and hire cars	800*	1,800
Doctors and Veterinary surgeons...	5*	1,000
Engineering maintenance (general, electrical, motor car)	80*	600
Building and civil engineering contractors	100*	500
Other trade cars (commercial vehicles, etc.)	460*	12,000
TOTALS	2,020 say, 2,000	16,974 say, 17,000

* Estimated.

STATEMENT OF TOTAL DEVELOPMENT OF PRIVATE MOBILE SERVICES IN THE LONDON AREA SINCE DECEMBER, 1951

<i>Year ended</i>	<i>Number of transmitters</i>	<i>Annual increase</i>
December 1951	825	—
„ 1952	1,158	333
„ 1953	1,483	325
„ 1954	2,020	537

APPENDIX 4

(para. 20 refers)

STATEMENT OF MANUFACTURING ORGANISATIONS AND THEIR REPRESENTATIVES CONSULTED BY THE COMMITTEE

Organisation :

Messrs. Hudson Electronic Devices,
Ltd.,
Appach Road,
London, S.W.2.

Messrs. Pye Telecommunications
Ltd.,
Newmarket Road,
Cambridge.

Radio Communication and Elec-
tronic Engineering Association,
11 Green Street,
London, W.1.

Represented by :

Mr. A. D. Hudson, B.Sc.(Eng.).

Mr. J. R. Brinkley.

Mr. A. A. Stedman.

Mr. S. N. Christie, M.A., LL.B.

Mr. J. W. Clater, B.Sc.(Eng.),
A.M.I.E.E.

Mr. P. J. Harvey, B.Sc., A.C.G.I.

Cmdr. C. M. Jacob, D.S.C.,
A.M.I.E.E., R.N. (Retd.).

Mr. O. S. Puckle, M.B.E., M.I.E.E.

Mr. H. C. Spencer, A.M.Brit.I.R.E.

Mr. J. H. Turner.

APPENDIX 5

(para. 23 refers)

PRESENT FREQUENCY PLAN

RECOMMENDED FREQUENCY PLAN

"Mobile" Freq.	Channel No.	Class of User	"Base" Freq.	"Mobile" Freq.	Channel No.	Class of User	"Base" Freq.
Mc/s 170·85	1	Ambulance	180·85 Mc/s	Mc/s 169·85	1	Municipal & Public Utilities, Industrial	165·05 Mc/s
	2				2		
	3				3	Electricity	
171·25	4	Medical	181·25	170·35	4		165·55
	5				5	Municipal & Public Utilities, Industrial	
	6				6		
171·55	7	Taxis & Trade Cars	181·55		7		
	8	Press			8	Reserve	
	9			170·85	9		166·05
	10				10	Ambulance	
171·95	11	Demonstration	181·95		11		
	12	Taxis and Trade Cars			12		
	13			171·25	13	Medical	166·45
	14				14		
	15				15	Taxis, Trade Cars	
	16			171·55	16		166·75
	17				17	Press	
	18				18		
	19				19		
	20			171·95	20	Demonstration	167·15
172·95	21	Municipal & Public Utilities, Industrial	182·95		21		
	22				22	Taxis and Trade Cars	
	23				23		
173·25	24	Electricity	183·25		24		
	25				25		
	26				26		
173·55	27	Municipal & Public Utilities, Industrial	183·55		27		
	28				28		
	29			172·95	29		168·15
	30				30	M. & P. Utilities, Industrial	
173·95	31		183·95		31		168·25
173·95	S1	Single Frequency Services		173·05	32		
	S2						
	S3						
	S4						
	S5						
	S6						
	S7						
	S8						
	S9						
	S10						
175·05	S11						168·95
							169·85

MINORITY REPORT BY CAPT. L. P. S. ORR, M.P., REPRESENTING THE
MOBILE RADIO USERS ASSOCIATION

I find it necessary to disassociate myself from the Committee's report, because although much valuable work has been done towards defining the problems, such solution as it offers to the problem confronting mobile radio cannot be recommended as being conducive to the present and future well-being of this important public service.

I cannot accept the contention in para. 5 of the Committee's report that the Committee have taken any significant steps towards finding a fair and reasonable compromise solution.

The Mobile Radio Committee was set up by the Postmaster General after representations were made to him by my Association. The land mobile users complained that as a result of the Government's decision, taken without consultation, they were to be forced to change frequency at great expense, and they were to lose frequencies that would otherwise have been available for present and future development.

In my view the report does nothing to lessen the grounds of the complaint laid by users, and only promises future consultations. While I welcome, and will fully cooperate in future consultations, the value of such consultation must depend upon satisfactory, representative machinery being established and a more positive appreciation of the value of mobile radio becoming a part of Government policy.

I take particular exception to the fact that the report fails to offer realistic security of tenure as promised personally by the Postmaster General at his meeting with our delegation on May 11th, 1954.

I further complain that the validity of an undertaking in writing given by the G.P.O. in November, 1949, that the band 165-184 Mc/s was available exclusively to a development of land mobile radio, has subsequently been denied by the G.P.O.

I further express the deep concern of my Association over the loss of frequencies to land mobile radio, the failure to provide adequate replacements, and the refusal to ensure that the loss of frequencies was borne equitably and not exclusively by land mobile radio services.

I propose to put forward my views in detail under six headings as follows:

1. COMPENSATION
2. SECURITY OF TENURE
3. LOSS OF CHANNELS
4. U.H.F.
5. CHANGE-OVER OF FREQUENCIES
6. FUTURE CONSULTATION

1. COMPENSATION

The Committee has estimated that there are some 2,400 mobile sets affected by the frequency change and one estimate of the cost of changing frequencies has been given as £20 per mobile. (This might well be an under-estimate.) If this figure is accepted £50,000's worth of private and public money will be required to pay for the cost of the change. A single large user (such as RadioCabs (London) Limited) may well be involved in expenditure of £10,000, which amounts to 25 per cent. of his total investment in equipment. This is an appalling penalty to impose upon a private company without

consultation, and in my view the Government has a strong moral responsibility to give financial assistance to those whom it has damaged as a result of its action.

When the common mains and grid system for electricity supply was inaugurated a method of compensation and alteration was made available to the user.

I feel that the principle of compensation should apply in this case and in all further cases of unilateral action of this kind. Whether the precise method is as used in the example above or otherwise is a matter for Government decision.

2. SECURITY OF TENURE

I have sought the views of our users, large and small, and have found complete unanimity of view that individual users should be given security of tenure. Larger users such as the Automobile Association, RadioCabs (London) Limited, Esso Petroleum Limited, etc., take the view that having based their operations on radio it would be impossible to revert to any other method of operation and that they must, therefore, retain their facilities permanently. They think they should be protected against changes of apparatus, frequency, etc., for a minimum period of five years, and I have pointed out that this means that the band of frequencies should be guaranteed for ten years. In their view there can be no question of introducing new standards by methods which do not permit existing users to obtain a reasonable economic life from their equipment, and they support the view that new standards can be introduced progressively and effectively provided there is adequate consultation with users.

I welcome the suggestion contained in the Committee's report that a block of frequencies should be assured to Mobile Radio users for a period of years, but I am gravely concerned that the Committee does not recommend any individual security of tenure whatsoever, since no protection is thus offered to the individual user against changes of frequency due to Government policy or administration.

I would point out that security of tenure to communication services is a well-established principle. A fifteen-year contract is enjoyed by the Wireless Relay Companies, the B.B.C. receive a ten-year charter, and I understand that the commercial television services, which are displacing the mobile radio services, will receive contracts for a term of years, which can only have validity if the Government are prepared to secure frequencies for the same period. If this can be done for one commercial service it can be done for another.

3. LOSS OF CHANNELS

The clearest possible undertaking was given in writing by the G.P.O. in November, 1949, that the band 165-184 Mc/s would be exclusively available for land mobile development and it was on the assumption that something like 90 channels would be available to carry land mobile radio traffic that users and manufacturers entered this field. That the G.P.O. will no longer stand by this statement leads us to question the reliance that can be put on any future statements on frequency policy which are not supported by a guarantee.

More than half this band having been surrendered to television services, I should have expected the Committee to support my recommendation that the burden of providing frequencies should be borne equitably by the users

in adjacent parts of the spectrum. I put forward proposals showing one method by which this could be done, but these proposals were not seriously examined, nor were similar proposals put forward by manufacturers.

In particular I have pointed out that there were under-developed portions of the maritime spectrum which could readily be used by, or shared with land users, and that the Home Office Police services were making uneconomic use of the frequencies available to them. Again these proposals did not receive serious consideration.

The plan now proposed by the Committee requires that land mobile services provide the extra frequencies required for television, apparently because they are the most easily moved, and because fortuitously they happen to lie adjacent to the new television band.

I have submitted estimates of development of transport services to the Committee, but no adequate attempt has been made to provide frequencies related to my estimates, and I am satisfied that the overall frequency arrangements have evolved without regard to either need, equity, or logic.

I am satisfied that adequate room for the development of land mobile radio could readily be made available in the V.H.F. band, but in nine months of existence the Committee have done nothing towards this end.

4. U.H.F.

I welcome the proposals of the Committee to make available a band at 450 Mc/s, but I must warn users that the only sets in production for this band cost something in the region of £250 each in the United States. Their volume, weight and current consumption are more than double that of V.H.F. sets currently available in this country. The performance obtained is also inferior. The two V.H.F. sets now selling the greatest quantity on the market cost £80 and £85 respectively.

In this matter I can only express sympathy with the manufacturers who have invested great sums of money in V.H.F. development, and who now, after only a few years of marketing, are to be told that "necessity is the mother of invention", and that they must now develop the U.H.F. range. As I see it, this is no way to encourage a new industry, and such recommendations must, in the end, react on the user and on the economy of the country.

5. CHANGE-OVER OF FREQUENCIES

On the question of television interference I have noted that there is no experience regarding spurious radiation from Band III transmitters and only limited experience of the interference from mobile transmitters to television receivers, and that the G.P.O. and manufacturers will carry out experimental work when the Band III transmitters are on the air.

If a mistake is made in the assessment of this kind of interference the consequences could be very serious. I have pointed out that the provision of frequencies in London and the problem of television interference could be readily and simply avoided by allocating channel 6 in the provinces only, but I regret that the Committee have not felt competent to make this important recommendation.

It is my recommendation that the frequency plans should not be finalised for mobile radio until this work has been carried out some months from now. I believe that time spent in a full examination of this problem would not hold up the commencement of the I.T.A. television programmes.

6. FUTURE CONSULTATION

I fully support the view expressed in the report that consultation is essential. I would, however, re-emphasise the importance of setting up the right kind of consultative machinery ; and I must express grave dissatisfaction with the present consultative machinery, since in the middle of the consultations the Postmaster General altered the agreed constitution of the Committee and deprived me of the right of bringing with me the technical adviser chosen by my Association.

CONCLUSION

In conclusion I would state that the report of the Mobile Radio Committee has done little to right the sense of wrong created by the Government's action in deciding to clear Band III of mobile radio services without consultation, and has done nothing to restore the confidence in mobile radio which was thereby damaged. I feel that much more vigorous action should be taken to provide frequencies for the development of mobile radio and that the Government should recognise its importance by giving it facilities and the support that it needs.

I have taken the utmost care to consult our many users by letter and by meetings throughout our negotiations on the Committee, and I have throughout pursued a line of action upon which they have been unanimous.

L. P. S. ORR.

29th March, 1955

COMMITTEE'S COMMENTS ON MINORITY REPORT BY CAPT. L. P. S. ORR, M.P.

COMPENSATION

1. We were informed that before the appointment of the Committee the Postmaster General had decided that it would be impossible to accept the principle of compensation. In view of Capt. Orr's observations it may not be out of place for us to indicate that we are of the same mind as the Postmaster General.

SECURITY

2. The Committee have the fullest confidence that an assurance by a Minister of the Crown, of the kind suggested in paragraph 18 of our Report, would provide the realistic security for which Capt. Orr asks. We are satisfied that guarantees to individual users would not be in the best interests of the mobile radio services as a whole.

LOSS OF CHANNELS

3. The Committee is unable to agree with Capt. Orr's interpretation of the letter from the G.P.O. of November, 1949, the relevant words of which are as follows:

"The portion of the band from about 165-184 Mc/s is now earmarked exclusively for land mobile services both public and private, but changes in the channelling of this portion of the band are not likely to affect existing users."

We are surprised by and cannot subscribe to, Capt. Orr's statement that "the overall frequency arrangements have evolved without regard to either need, equity or logic."

U.H.F.

4. The use of U.H.F. seems to us a natural development and by disparaging its use Capt. Orr is, in our view, doing a disservice to the growth of the land mobile services.

CHANGE-OVER OF FREQUENCIES

5. For the reasons given in paragraph 22 (a) of our Report we believe that our recommendations regarding the new land mobile frequency bands are soundly based.

FUTURE CONSULTATION

6. We welcome Capt. Orr's support of our recommendations about future consultation, and we can only regret that he has been disappointed with the present consultative machinery.

GENERAL

7. Capt. Orr's minority report indicates that there is at present deep and widespread concern on the part of the users of land mobile radio, and suggests that this will not be lessened if the new arrangements recommended by the Committee are introduced. In view of the analysis given in our Report, we are reluctant to believe that Capt. Orr's rejection of the proposed arrangements will reflect the considered views of users as a whole.